



Dart Aerospace Ltd.
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D412-664-203TRN
Job Sheet 187250



Part No: D412-664-203TRN

Job Qty: 1 ea

Part Name: Crosstube Turning Detail



Part Weight: 0 lbs

Status: New

Priority: Medium

Job Created: 11/29/18

Job Tracking No:

Due Date: 12/21/18

Created By: Jesse White

Type: Stock

Description:

Note: D412-664-243 REV F IPP Rev:A 08-03-06 new issue DD verified by:eec IPP Rev B 08.04.02 Removed polish
EC verified by: DD

Ship Via:

Bill of Materials

Job Routing

Op No	Operation	Qty	Start Date	Due Date	Standard		Workcenter/Supplier		Sign-off
					Setup Hrs	Run Hrs	Workcenter / Supplier	Lead Time	
90	Start up Operation	1 Ea	12/21/18	12/21/18	0.00	0.00	Start Up Crosstubes-2		MD 2019-01-16
100	Mori Seiki	1 pcs	12/21/18	12/21/18	3.21	1.33	Mori Seiki TL-40		MD 2019-01-17
110	QC	1 pcs	12/21/18	12/21/18	0.00	0.00	QC2-3		MD 2019-01-17
120	Mori Seiki	1 pcs	12/21/18	12/21/18	0.00	1.67	Mori Seiki TL-40		MD 2019-01-21
130	QC	1 pcs	12/21/18	12/21/18	0.00	0.00	QC2-3		MD 2019-01-21
140	QC	1 pcs	12/21/18	12/21/18	0.00	0.00	QC8		MD 2019-01-21
145	Crosstubes	1 pcs	12/21/18	12/21/18	0.00	0.25	Crosstubes-2		MD 2019-01-21
150	HandFXtube	1 pcs	12/21/18	12/21/18	0.00	0.92	HandFinish5		MD 2019-01-21
160	QC	1 pcs	12/21/18	12/21/18	0.00	0.00	QC7-3		MD 2019-01-21
170	Packaging	1 pcs	12/21/18	12/21/18	0.00	0.00	Packaging3-2		MD 2019-01-21
180	QC21-SA	1 Ea	12/21/18	12/21/18	0.00	0.00	QC21		MD 2019-01-21

Part Op 100 - 1-Fill tube with sand & install plugs 412-203 on both ends as per Folio FA166 2-Face both sides of tube 3-Turn first
Descriptions: taper section on both side as per Folio FA166 4- blend transition lines using belt sander with 60 grit sandpaper
120 - 1-Turn second taper on both sides as per Folio FA166 2- Blend transition lines using belt sander with 60 grit
sandpaper. 3- Remove sand and plugs 4-Scribe part # and batch # using vibrating stilus
145 - GRIND ONLY TRANSITION LINES SMOOTH LONGITUDE WAY.
150 - 1- handfinish X-TUBE INSIDE AND OUT
170 - LOCATION : LG014

Job BOM

Part / Item	Component Name	Quantity	Operation	Container
D6009-129	Crosstube Material	1 Ea (1 ea)	90-Start up Operation	B123472

Job Allocations

Operation	Component Part	Required	Inventory	Allocated
90-Start up Operation	D6009-129	1	101	0

Part Specifications

Specifications could not be found.

Entered: _____ Date: _____

WORK ORDER NON-CONFORMANCE / ROUTE UPDATE

Route update only ☐

NCR No. _____

DISPOSITION

Job: _____

Part No. _____

Rewo
Scra
Use-as-

Date :

Sequence #:

Description Work Order Deviation

Root Cause

Operator ☐
Manufacturing Process ☐
Equip/Tooling ☐
Handling/Presservation ☐
Material ☐
Product Improvement ☐
Process Improvement ☐
Human Factors ☐

FAULT CATEGORY

☐ Pressure/Forced	☐ Contamination	☐ Power Loss/Surge	☐ Positioned Wrong
☐ Bending	☐ Misaligned/off center	☐ Folio/Program	☐ Outside Tolerance
☐ Crushing	☐ BOM/Route	☐ Grain Direction	☐ Drawing
☐ Cracks	☐ Broken/Damage/Defect	☐ Weld	☐ Finish
☐ Crimp/Kink/Ripple/Wave/Twist	☐ Incomplete/Unclear Instructions	☐ Wrong Stock Pulled	☐ Part Lost/Missing
☐ Marks/Chatter	☐ Drill Holes	☐ Out of Sequence	☐ Misread
☐ Mislabeled	☐ Fit/Function	☐ Off-set/Set-up	

Other/Details:

DART
AEROSPACE

Container No: S145126
Part: D412-664-203TRN
Job No: 187250
Serial No/Batch: S145126
Revision: F
Inspector:
Exp Date:
Instructions:

Date: 01/16/19

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DART AEROSPACE LTD	Work Order: 187250
Description: Crosstube Assembly (412 High Aft)	Part Number: D412-664-243
Inspection Dwg: D412-664-243 Rev: F	Page 1 of 2

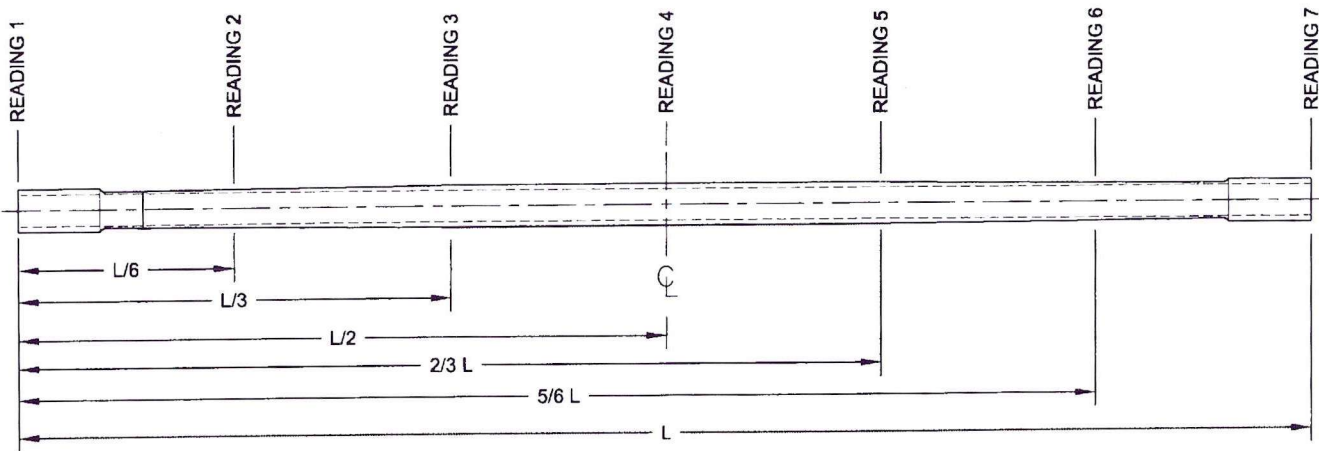
FIRST ARTICLE INSPECTION CHECKLIST

Inspection Sheet	Drawing Dimension	Tolerance	Actual Dimension	Accept	Reject	Method of Inspection	Comments
SIDE A	2.684	+0.005/-0.000	2.688	✓		CNC-04	
	2.748	+0.005/-0.000	2.752	✓		↓	
	2.884	+0.005/-0.000	2.889	✓		↓	
	3.019	+0.005/-0.000	3.024	✓		CNC-05	
	3.163	+0.005/-0.000	3.168	✓		↓	
	3.308	+0.005/-0.000	3.313	✓		↓	
	3.429	+0.005/-0.000	3.434	✓		↓	
	2.990	+0.005/-0.000	2.993	✓		CNC-04	
	2.618	+0.005/-0.000	2.622	✓		"	
	0.200	+/-0.010	.200	✓		CNC-08	
	R0.063	+/-0.010	.063	✓		RG	
	R0.500	+/-0.010	.500	✓		RG	
	4.971	+/-0.030	4.977	✓		CNC-08	
SIDE B	2.684	+0.005/-0.000	2.688	✓		CNC-04	
	2.748	+0.005/-0.000	2.753	✓		↓	
	2.884	+0.005/-0.000	2.889	✓		↓	
	3.019	+0.005/-0.000	3.024	✓		CNC-05	
	3.163	+0.005/-0.000	3.168	✓		↓	
	3.308	+0.005/-0.000	3.313	✓		↓	
	3.429	+0.005/-0.000	3.434	✓		↓	
	2.990	+0.005/-0.000	2.993	✓		CNC-04	
	2.618	+0.005/-0.000	2.622	✓		"	
	0.200	+/-0.010	.203	✓		CNC-08	
	R0.063	+/-0.010	.063	✓		RG	
	R0.500	+/-0.010	.500	✓		RG	
	4.971	+/-0.030	4.975	✓		CNC-08	
	124.100	+/-0.020	124.110	✓		Tape	

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DART AEROSPACE LTD	Work Order: 187250
Description: Crosstube Assembly (412 High Aft)	Part Number: D412-664-243
Inspection Dwg: D412-664-243 Rev: F	Page 2 of 2

WALL THICKNESS MEASUREMENT



Location	WALL THICKNESS MEASUREMENT (IN)				Deviation Δw (max-min)	TOLERANCE
	w1	w2	w3	w4		
READING 1 L = 0"	.363	.354	.375	.382	.028	0.073"
READING 2 L = 20.683	.291	.327	.323	.290	.037	
READING 3 L = 41.367	.467	.504	.505	.469	.038	
READING 4 L = 62.050	.618	.626	.634	.630	.016	
READING 5 L = 82.733	.447	.500	.510	.471	.063	
READING 6 L = 103.417	.294	.324	.322	.296	.030	
READING 7 L = 124.100	.372	.356	.376	.380	.024	

Calibration Result

Actual Block Thickness: 100-750

Sitescan 250 Measured Thickness: 100-750

DAS
67
9-89

Measured by: MD
Date: 2019-01-21

Audited by: DAS 67 9-89
Date: 19-02-20

Preliminary Approval:
Date:

Rev	Date	Change	Revised by	Approved
A	04.06.16	New Issue (P/O D412-664-203)	KJ/JLM	
B	06.03.09	Dwg Rev updated	KJ/JLM	
C	07.05.08	Tolerance updated for dimension 4.971	KJ/JLM	
D	10.02.02	Dimension 124.100 was 124.09	KJ	
E	12.06.04	Wall thickness form added	KJ	
F	14.06.24	Dwg Rev updated	KJ	

Item	Qty -243	Part Number	Description
1	X	D412-664-243	CROSSTUBE ASSEMBLY (412 HIGH AFT)
2	1	D6009-129	CROSSTUBE
3	2	D3595-063-570	RUBBER CUSHION
4	1	D2896-1	SUPPORT
5	2	D3189-1	CHAFING SHIELD
7	4	MS21920-28	CLAMP
8	2	MS21920-30	CLAMP (OR MS21920-32)
9	A/R	SCOTCH-WELD DP460	EPOXY ADHESIVE, 3M SCOTCH-WELD
10	A/R	PROSEAL 890 B-2	SEALANT

GENERAL NOTES:

- 1) MATERIAL: MANUFACTURED FROM D6009-129
FINISHED LENGTH = 124.100±0.020 (BEFORE BENDING)
- 2) FINISH: CHEMICAL CONVERSION COAT PER DART QSI 005 4.1
PRIME INSIDE AND OUTSIDE PER DART QSI 005 4.2
MASK UNDERSIDE OF CROSSTUBE AS SHOWN (ZN C6-2, HATCHED AREA)
PAINT OUTSIDE PER DART QSI 005 4.2
AFTER PAINTING, REMOVE MASKING AND APPLY MATTE CLEAR COAT
- 3) TOLERANCES: PER DART QSI 018 UNLESS OTHERWISE NOTED.
- 4) UNITS: INCHES UNLESS OTHERWISE NOTED.
- 5) BREAK SHARP EDGES: 0.005 TO 0.010 MAX.
- 6) IDENTIFICATION: DART P/N "D412-664-243" AND B/N ON INSIDE OF CUFF PER QSI 044 6.4 (VIBRATING STYLUS)
- 7) WEIGHT: 47.0 lbs
- 8) PART IS SYMMETRIC ABOUT CENTERLINE.
- 9) EXTREME CARE MUST BE TAKEN TO PROTECT THE OUTSIDE SURFACE OF THE TUBE. THE OUTSIDE SURFACE MUST BE SMOOTH AND FREE FROM SURFACE DEFECTS SUCH AS SCRATCHES, NICKS, OR DENTS. DEFECTS UP TO 0.005" MAY BE BLENDED OUT LONGITUDINALLY. CIRCUMFERENTIAL GRIND MARKS ARE UNACCEPTABLE. DO NOT GRIND TUBE AFTER SHOT PEEN.

TURNING

- 10) WHEN TRANSITIONING TO STOCK MAT'L, RUN CUTTER OFF PART. BLEND OUT EDGE LONGITUDINALLY. TRANSITION SHOULD BE SMOOTH.

BENDING

- 11) BEND PROGRESSIVELY WITH A MINIMUM OF 8 PASSES. MAXIMUM TUBE FLATTENING DUE TO BENDING IS 7% (BASED ON O.D.) IN LOWER HALF OF R30 BEND AND 6% (BASED ON O.D.) ON REMAINING TUBE.
- 12) LIQUID PENETRANT INSPECT OUTSIDE SURFACE OF CROSSTUBE PER QSI 038. TO BE PERFORMED AFTER FINAL POST-BEND GRINDING. ANY ADDITIONAL GRINDING REQUIRES ANOTHER LPI INSPECTION.

ASSEMBLY

- 13) INSTALL D2896-1 CENTER SUPPORT USING A 0.04" TO 0.07" THICK LAYER OF SCOTCH-WELD DP460 PER QSI 015.
- 14) INSTALL MS21920-30 CLAMPS (OR -32) WITH D3595-063-570 RUBBER CUSHIONS TO SECURE THE D2896-1 SUPPORT ON TOP SIDE OF THE CROSSTUBE. ENSURE CLAMPS ARE ON TOP SIDE OF CROSSTUBE.
- 15) APPLY A THIN COAT OF PROSEAL 890 ON INSIDE CONCAVE SURFACE OF D3189-1 CHAFING SHIELD AND LET CURE PER MANUFACTURER'S INSTRUCTIONS. INSTALL PROSEALED D3189-1 CHAFING SHIELD ONTO CROSSTUBE BY APPLYING A THIN COAT OF PROSEAL 890 ONTO CROSSTUBE. BE SURE TO ELIMINATE ANY AIR GAPS.
- 16) TORQUE CLAMPS ON D2896-1 SUPPORT 80 TO 100 IN-LB. TORQUE CLAMPS ON D3189-1 CHAFING SHIELD 40 TO 50 IN-LB. ENSURE AT LEAST 1.5 THREADS SHOWING IN SAFETY AND THAT NUT HAS NOT BOTTOMED-OUT AFTER TORQUING. PRIOR TO PACKAGING, RE-CHECK TORQUE ON CLAMPS AFTER ADHESIVES HAVE CURED FOR 24 HOURS.

RELEASED
2014-05-26

F	NOTES RE-ORDERED, SCOTCH-WELD WAS MAGNOBOND (C8-1), ADD CLAMP RETORQUE (A8-1), REMOVE ABRASION STRIP, ADD INSPECTION WINDOW (C8-1), CHAFING SHIELD NOW 4.38 WIDE (C8-2), ADD 7% CRUSHING (B8-1), CHG BEND HEIGHT TOL. TO ±0.25 (C1-3), CHG CUFF TOL. (D2-4), CLAMPS FLIPPED TO PREVENT CHAFING (B7-2, B7-3), INCORP. DEO E-2/4	CP	14.04.01
E	REFORMAT/REVISE GENERAL NOTES; REORGANIZED VIEWS AND REFORMATTED DRAWING TO CURRENT STANDARDS; RELOCATED FLAG #8 PER PAR 08-046 (ZN A6-3); ADD TOLERANCE (ZN B6-3, C4-3, C8-3 & C5-3); MOVED TURNING DETAIL & UPDATED TOLERANCE TO SHEET 4.	RF	09.09.30
D	REMOVE D2732-058, CHANGE TO D3595-063-570	PH	07.03.09
C	REMOVE D2856-600-1087, ADD D2732-068 & MAGNOBOND 8398, MS21920-32 WAS MS21920-30	MB	06.10.27
B	ADD HOLES FOR COMPATABILITY WITH BHT/AA SKIDTUBES	PH	05.02.04
A	NEW ISSUE	PH	01.10.17
REV.	DESCRIPTION	BY	DATE
DESIGN			
DRAWN			
CHECKED			
MFG. APPR.			
APPROVED			
DE APPR.			
DATE	14.04.01		

DART AEROSPACE LTD HAWKESBURY, ONTARIO, CANADA	
DRAWING NO. D412-664-243	REV. F SHEET 1 OF 4
TITLE CROSSTUBE ASSEMBLY (412 HI AFT)	SCALE NTS
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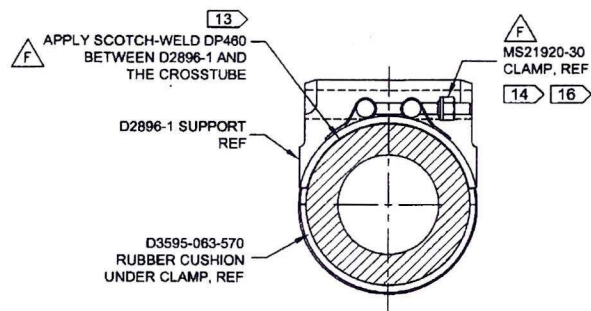
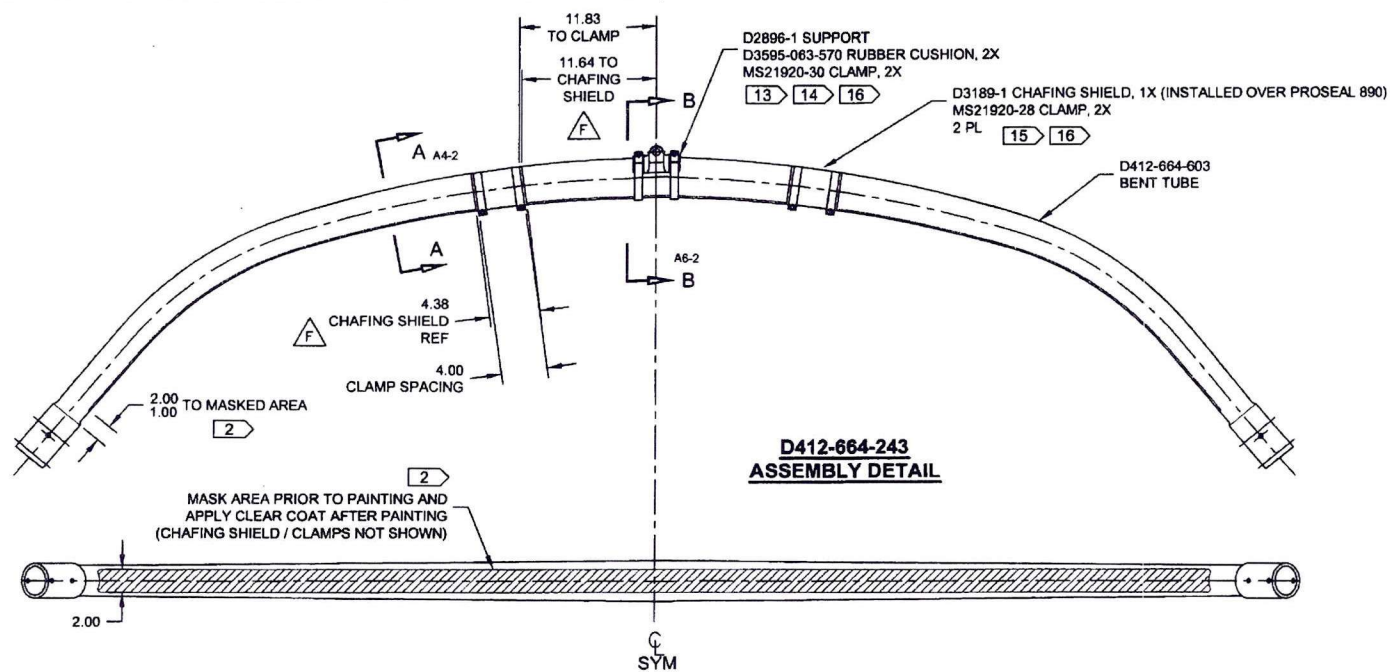


WORK ORDER NON-CONFORMANCE / ROUTE UPDATE

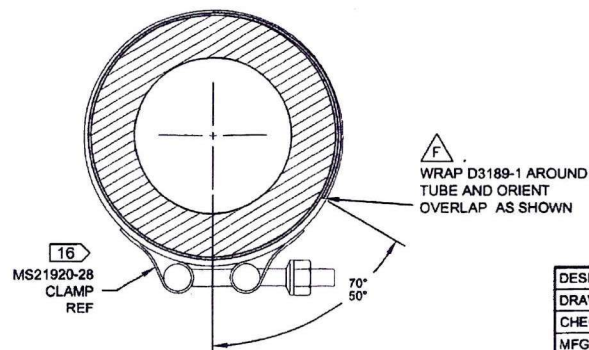
NCR No. _____

Route update only ☐

Job: _____ Part No. _____	DISPOSITION Rework ☐ Scrap ☐ Use-as-is ☐	DEPARTMENT/PROCESS Skid-tube ☐ Machining ☐ Large Fab ☐ Cross tube ☐ Small Fab ☐ Finishing ☐ Eng. (Non-AW) ☐ Prod. Eng. Coord. ☐ Rec/Store/Packaging ☐ Engineering ☐ Water Jet ☐ Supplier ☐ Quality ☐			
Date :	Sequence #:	QTY Affected :		MRB (QSI042)	
Description Work Order Deviation		Disposition		Completed By	
				Lead hand / Supervisor	
				QC / QA Coordinator	
Root Cause Operator ☐ Manufacturing Process ☐ Equip/Tooling ☐ Handling/Preservation ☐ Material ☐ Product Improvement ☐ Process Improvement ☐ Human Factors ☐ ☐ Pressure/Forced ☐ Bending ☐ Crushing ☐ Cracks ☐ Crimp/Kink/Ripple/Wave/Twist ☐ Marks/Chatter ☐ Mislabeled ☐ Contamination ☐ Misaligned/off center ☐ BOM/Route ☐ Broken/Damage/Defect ☐ Incomplete/Unclear Instructions ☐ Drill Holes ☐ Fit/Function ☐ Power Loss/Surge ☐ Folio/Program ☐ Grain Direction ☐ Weld ☐ Wrong Stock Pulled ☐ Out of Sequence ☐ Off-set/Set-up ☐ Positioned Wrong ☐ Outside Tolerance ☐ Drawing ☐ Finish ☐ Part Lost/Missing ☐ Misread		Other/Details:			



SECTION B-B D4-2
SCALE 4X



SECTION A-A D6-2
SCALE 6X

RELEASED
2014-05-26

DESIGN		DART AEROSPACE LTD
DRAWN		HAWKESBURY, ONTARIO, CANADA
CHECKED		DRAWING NO. REV. F
MFG. APPR.		D412-664-243 SHEET 2 OF 4
APPROVED		TITLE SCALE
DE APPR.		CROSSTUBE ASSEMBLY (412 HI AFT) NTS
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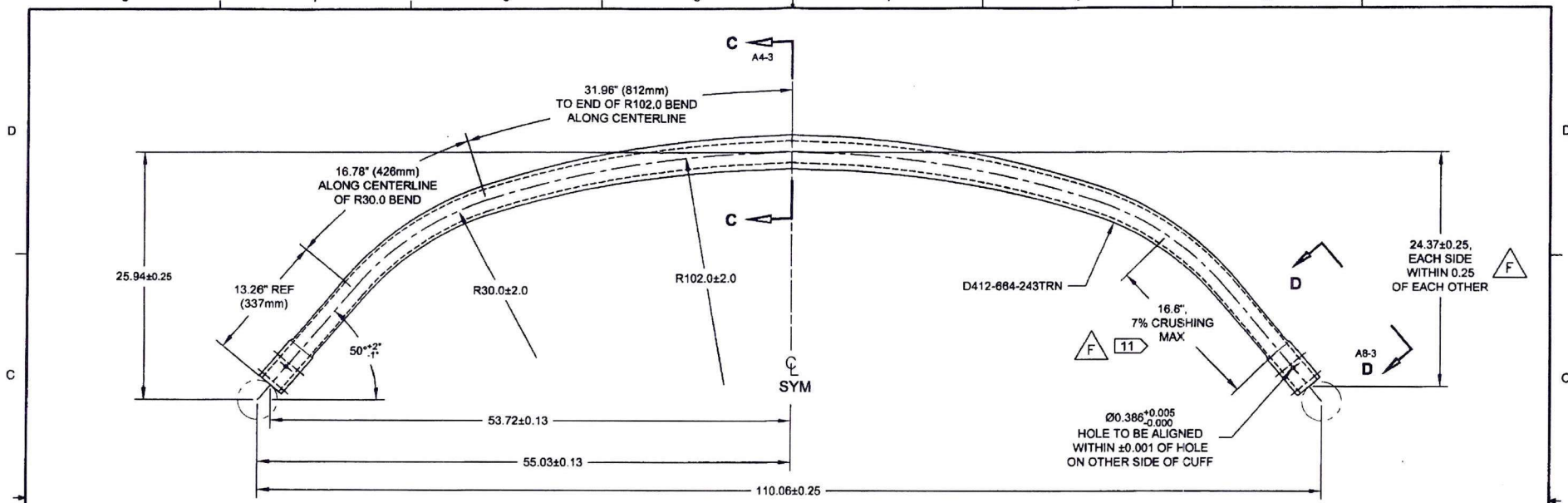
WORK ORDER NON-CONFORMANCE / ROUTE UPDATE

NCR No. _____

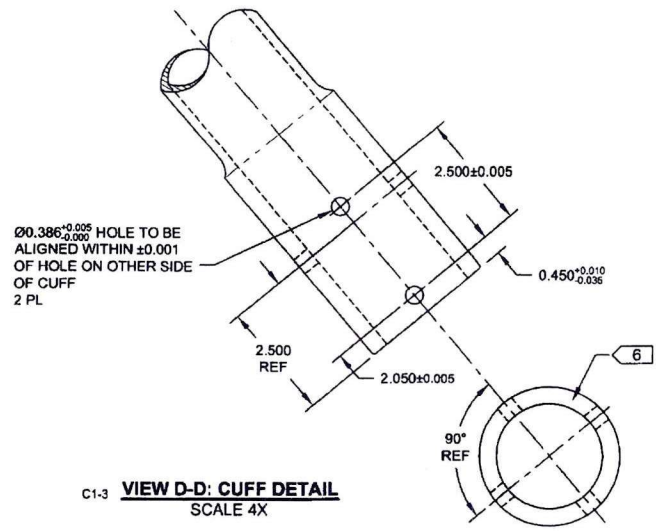
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Job: _____ Part No. _____	DISPOSITION Rework ☐ Scrap ☐ Use-as-is ☐	DEPARTMENT/PROCESS Skid-tube ☐ Machining ☐ Large Fab ☐ Cross tube ☐ Small Fab ☐ Finishing ☐ Eng. (Non-AW) ☐ Prod. Eng. Coord. ☐ Rec/Store/Packaging ☐ Engineering ☐ Water Jet ☐ Supplier ☐ Quality ☐			
Date : _____	Sequence #: _____	QTY Affected : _____		MRB (QSI042)	
Description Work Order Deviation		Disposition		Completed By	
				Lead hand / Supervisor	
				QC / QA Coordinator	
Root Cause Operator ☐ Manufacturing Process ☐ Equip/Tooling ☐ Handling/Preservation ☐ Material ☐ Product Improvement ☐ Process Improvement ☐ Human Factors ☐ ☐ Pressure/Forced ☐ Bending ☐ Crushing ☐ Cracks ☐ Crimp/Kink/Ripple/Wave/Twist ☐ Marks/Chatter ☐ Mislabeled ☐ Contamination ☐ Misaligned/off center ☐ BOM/Route ☐ Broken/Damage/Defect ☐ Incomplete/Unclear Instructions ☐ Drill Holes ☐ Fit/Function ☐ Power Loss/Surge ☐ Folio/Program ☐ Grain Direction ☐ Weld ☐ Wrong Stock Pulled ☐ Out of Sequence ☐ Off-set/Set-up ☐ Positioned Wrong ☐ Outside Tolerance ☐ Drawing ☐ Finish ☐ Part Lost/Missing ☐ Misread		FAULT CATEGORY Other/Details: _____			

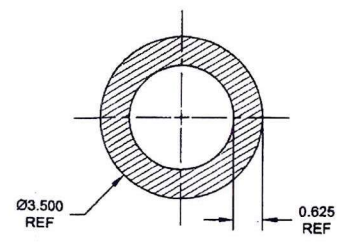
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D412-664-603
BENDING AND DRILLING DETAIL



VIEW D-D: CUFF DETAIL
SCALE 4X



SECTION C-C D5-3
SCALE 4X

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2014-05-26

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DRAWN		HAWKESBURY, ONTARIO, CANADA	
CHECKED		DRAWING NO. D412-664-243	REV. F
MFG. APPR.		SHEET 3 OF 4	
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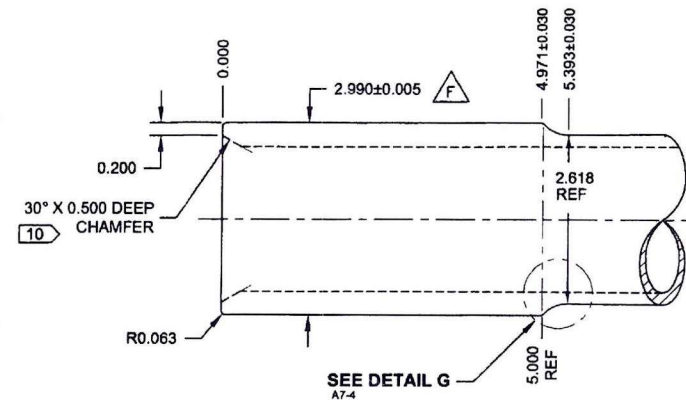
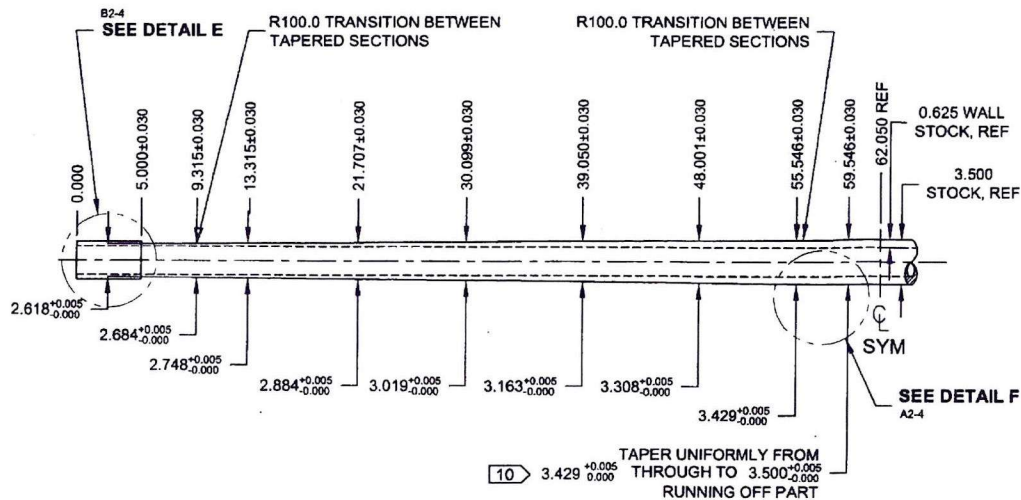


WORK ORDER NON-CONFORMANCE / ROUTE UPDATE

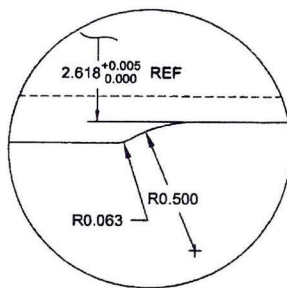
NCR No. _____

Route update only ☐

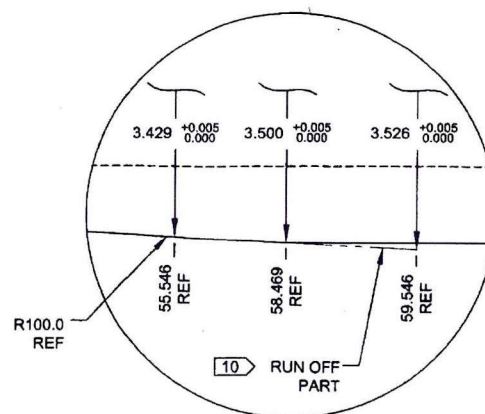
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Other/Details:					



**DETAIL E:
CROSSTUBE CUFF** D8-4
SCALE 5X



**DETAIL G:
CUFF TRANSITION** C2-4
SCALE 10X



**DETAIL F:
TAPER RUN-OFF** C4-4
NOT TO SCALE

RELEASED
2014-05-26

DESIGN	92	DART AEROSPACE LTD	
DRAWN	92	HAWKESBURY, ONTARIO, CANADA	
CHECKED	DC	DRAWING NO.	REV. F
MFG. APPR.	LA	D412-664-243	SHEET 4 OF 4
APPROVED	LA	TITLE	SCALE
DE APPR.	LA	CROSSTUBE ASSEMBLY (412 HI AFT)	NTS
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**D412-664-243TRN
TURNING DETAIL**

Entered: _____ Date: _____



WORK ORDER NON-CONFORMANCE / ROUTE UPDATE

NCR No. _____

Route update only ☐

Job: _____ Part No. _____	DISPOSITION Rework ☐ Scrap ☐ Use-as-is ☐	DEPARTMENT/PROCESS Skid-tube ☐ Machining ☐ Large Fab ☐ Cross tube ☐ Small Fab ☐ Finishing ☐ Eng. (Non-AW) ☐ Prod. Eng. Coord. ☐ Rec/Store/Packaging ☐ Engineering ☐ Water Jet ☐ Supplier ☐ Quality ☐			
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				Lead hand / Supervisor	
				QC / QA Coordinator	
Root Cause Operator ☐ Manufacturing Process ☐ Equip/Tooling ☐ Handling/Presservation ☐ Material ☐ Product Improvement ☐ Process Improvement ☐ Human Factors ☐ ☐ Pressure/Forced ☐ Bending ☐ Crushing ☐ Cracks ☐ Crimp/Kink/Ripple/Wave/Twist ☐ Marks/Chatter ☐ Mislabeled		FAULT CATEGORY ☐ Contamination ☐ Misaligned/off center ☐ BOM/Route ☐ Broken/Damage/Defect ☐ Incomplete/Unclear Instructions ☐ Drill Holes ☐ Fit/Function ☐ Power Loss/Surge ☐ Folio/Program ☐ Grain Direction ☐ Weld ☐ Wrong Stock Pulled ☐ Out of Sequence ☐ Off-set/Set-up ☐ Positioned Wrong ☐ Outside Tolerance ☐ Drawing ☐ Finish ☐ Part Lost/Missing ☐ Misread			
Other/Details:					